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Design and Implementation of Heart Disease Prediction Using Artificial Neural Network

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Abstract : The primary goal of this initiative is to use hospital statistics to forecast cardiac disorders. Our project's major goal is to provide a result with more precision. The suggested system in the study denotes the use of ANN for the diagnosis of illnesses acquired in the heart. The standard data , which uses pre-accepted data as feedback and offers the clear-cut clarity about the respiratory system through various processes including data collecting and data mining, is used to anticipate illness. The necessary information is gathered and acquired in a standardized format. Age, blood pressure, cholesterol, sex, blood sugar, and other characteristics are retrieved from medical profiles in order to forecast a patient's likelihood of developing heart disease The neural network in the proposed system connects with many components, collecting input as a waveform and acquiring data in it. The primary system, via which the system receives aggregated input and conducts the prediction process, is coupled to the neural branches.

Keywords-ANN, Prediction, Algorithm, Respiratory.

I.INTRODUCTION

Over 17.9 million, according to the World Health Organization. The majority of individuals nowadays are developing cardiac conditions because of their modern and hi-tech lifestyles. disease that sometimes hits a person with such a shock that prompting prompt medical attention is not possible. The hospital database is accessed to get the patient's information, and characteristics like blood pressure, cholesterol, age, and gender are examined to determine if the patient is at risk for heart disease or not.

In order to anticipate the existence or absence of health illnesses like Heart diseases and other conditions, data mining is crucial. [1] If foreseen in advance, such information might offer clinicians crucial insights, allowing them to customise patient care. Nearly 33 out of every 100 individuals have a cardiac problem.. [3] And in them nearly 25 % of them are severely affected by the disease out ofthem only some could get rid of it and life for rest of them are questionable. [4] Such a serious problem can be rectified by the proposed method which circumstances the ANN as a theme nature of this research paper.

The ANN algorithm analyses the two distinct data sets— previous data and new upcoming data—in such a way that they carry out some specific methodologies and calculations. The system then carries out the analysis on the new data and compares the results with the new data to provide a disease prediction. [5] Here, neural networks are linked to several sources in order to give the central system correct data. This technology starts collecting data with neutral authentication after initialising blood samplesfrom several groups.

The study compares the accuracy of heart disease prediction using medical information to other machine learning methods. The suggested method promises to be very important and successful in managing categorization, approximating ML (Machine Learning) with regard to ANN-based model. The following list of categories for journals: Earlier author's work is illustrated in Section II. The suggested system of heart disease categorization, prediction, and overview of various stages was presented in Section III. Block schematic is presented in Section IV. The results of the experiment are shown in Section V. Theprogression of performance is seen in Section VI. Finally, Section VII discusses the findings and suggests further investigation.

II.RELATED WORK

In this section, we introduce various researches relevant to our research. The content of this paper can be summarized as heart disease identification and prediction before its occurrence in the human

respiratory system using image processing and Artificial Neural Network.

Smart Heart Disease Prediction using Naive Bayesian Algorithm, Random Forest K Nearest Neighbour Algorithm and Decision Tree, are the related work done in this title Cascade Classification of image processing is a related work done by the system. This technique has four characteristics.

One is that by using Integral Image, features used by the detector can be computed very quickly, making its computation complexity [1] - [2].

Second method is by constructing the classifier by selecting a small number important feature using a learning algorithm, yielding a very efficient classifier [2].

Third method is acquired for combining increasingly more complex classifiers in cascade fashion, making it dramatically fast [3].

Fourth method is segregating the diseases in various segments with defected samples and gets it compared with un-defected samples which will further gets processed with the new acquiring data and acquisition data [4].

Disadvantages:

1. The traditional methods are used to identify the disease after the occurrence of the symptoms and signs for the heart based disease.
2. These methods can be used for some of the normal diseases such as the Fever, Stomach pain and Virus based predication.
3. And cannot be implemented in the respiratory based problems.

III. Proposed System

The majority of individuals nowadays have heart disease, which comes on suddenly and often prevents people from getting treated right away because of today's modern and hi-tech lifestyle. Because diseases that affect the pulmonary system can lead to severe cardiac defects and can stop the blood flowing to both the articles and ventricles, early diagnosis and illness prediction should be communicated as soon as feasible. These might make it easier for the heart to experience cardiac arrest, which would likely lead to a heart attack.

If the analysis is bad, the hospital will get to ruin their reputation and start working. These studies concentrate on previously collected data that has been analysed and provide fresh information that is updated with each new checkup. This information allows the doctor to proceed with therapy and cure the patient. [6] Since certain UV and X-rays are used to scan the interior organs, the data from those scans are immediately upgraded with the data from those scans that are further processed when a blockage is detected and requires explanation.

Advantages:

1. The information given to the physician is correct, andthey use it further for therapy
2. It is an algorithm for time consumption.
3. The new algorithm substantially improves andincreases the accuracy.

IV Block Diagram

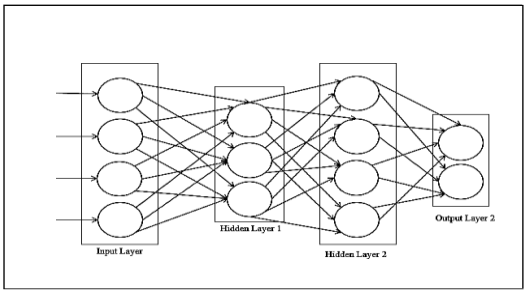

Fig.1 Block Diagram ofANN

The Fig 1 represents the block diagram of proposed methodologies and not the proposed model the block diagram of the proposed model is shown in the Fig 2.

This model consists of several layers, where the input are gathered, processed and given output with the neural connected system.

Input Layer

The input layers act as data gatherers by combining newly updated data with previously acquired data. These data are employed in a manner that involves mathematicalcomputations,experimental investigation, and processing of the results as a disease predictor.

Hidden Layer-1

This layers are used in hidden part of the neural system with the initial calculation of the processing

for the data accumulation and data mining where the comparison of the data takes place and the synchronized or unsynchronized data get accumulated.

Hidden Layer-2

This layers are used in hidden part of the neural system with the final calculation of the processing for the data accumulation and data mining where the comparison and critical analysis of the data takes place its further calculation are get synchronized or unsynchronized data get accumulated and processed for the output layer.

Output Layer

This layer is the final layer of the system where the input get accumulated and processed for the further clarification of the data with the previous data. And here the process of storage of new data takes place. Because this layer is the analytical layer where the data are processed as previous data and stored for future calculation.

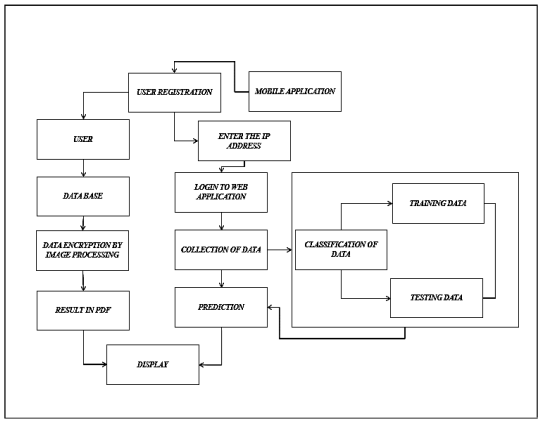

Fig.2 Block Diagram of Proposed Model

The block design of the suggested model is shown in Fig. 2, which includes user registration with the mobile application, value processing and accumulation with the processor, data gathering for the processor, and data classification into two sets, Testing Data and Training Data.

The block design of the suggested model is shown in Fig. 2, which includes user registration with the mobile application, value processing and accumulation with the processor, data gathering for the processor, and data classification into two sets, Testing Data and Training Data.

The processing data is supplemented by the testing data, which provides new information. The system synchronises the previous value and processes the application for the prediction of disease using a likely analysis using the training data, which are the previous values of the data.

The neural networks algorithm is given these two types of data sets to process, and once it is finished, the output is shown with the old data updated with thenew data. The updated data sheets that show these outcomes are available for download as PDF files. and the forecast % is shown. and displays the value with a Positive or Negative outcome..

V ALGORITHMVI EXPERIMENTAL ANALYSIS

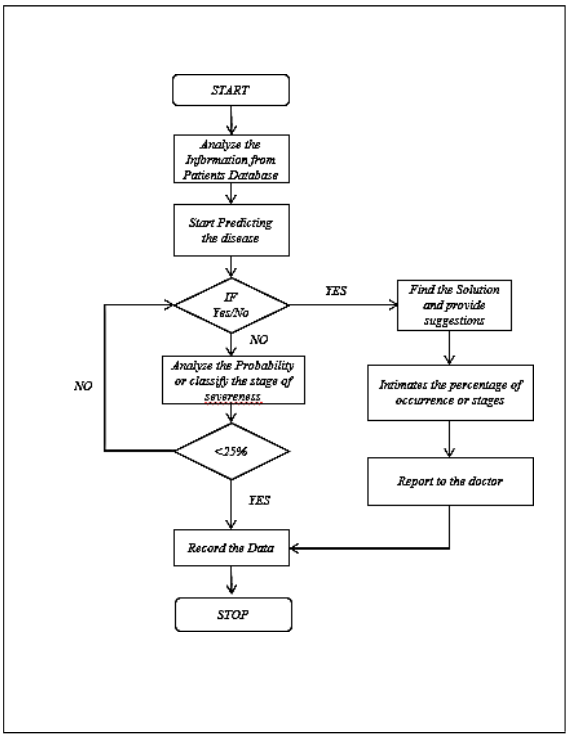

Fig.3 Algorithm of Artificial Neural Network for the Proposed Model

Steps involved in ANN Algorithm

Step 1: Start the Program.

Step 2: Analyse the Information of previous data with the present data.

Step 3: The present data are analysed and formulated by the ANN Algorithm.

Step 4: The feedback loop is created in such a way that compare the obtaining results.

Step 5: Compare those results to check for any variation.

Step 6: If the program prints Yes proceed for further

process like report the data.
Step 7: Else go to the calculation for probability of occurrence.
Step 8: If percentage of occurrence is more than 25%
Step 9: Repeat the step 2 proceeds the same until get displayed either positive or negative
Step 10: Then stores the result and send to main patient's data base
Step 11: And show the result in PDF and display it.
Step 12: Stop the Process.

The definition of the sigmoid function is the initial process of the analysation where the data of that produces (1) almost the same output as an ordinary threshold a step function but is mathematically simpler. It can Derived as,

$$y = \frac{1}{(1 + e^{-x})}$$

$$\frac{dy}{dx} = (1 - y) \qquad (1)$$

By Implementing the Back-Propagation Algorithm Next, the unit calculates the activity some function of the total weighted input. Typically, we use the sigmoid function,

$$x = \frac{1}{(1 + e^{net}j)} \qquad (2)$$

The feedback is being calculated with the error by using the following formula,

$$E = \frac{1}{2} \sum_j (x_j - \ )^2_j \qquad (3)$$

Here,

x_j is the activity level of all the j[th] units in the top layer,

t_j is the desired target output of the j[th] units

$$\frac{E}{W}_{ij} = \frac{\partial E}{\partial W_{ij}}$$

The above equation allocates the space area for the data acquisition. This allocation always gets updated by the algorithm as it acts as the feedback of the process.

$$\frac{E}{W}_{ij} = \frac{\partial E}{\partial Net_j} \frac{\partial Net_j}{\partial W_{ij}} \qquad (5)$$

Equalise the result with the prediction strategy and get it allocated with the process of the identification of the disease before its minute cause and progress.

$$EW_{ij} = EI_iX_i$$

$$EW_{ij} = E(1 - X_j)X_i$$

$$EW_{ij} = (X_j - \ )(1 - X_j)X_i \qquad - Output$$

VII Results And Discussion

The process variation used in the currently used procedures is provided in this section. This entails the extraction of straightforward but crucial specifics, the essential information that is concealed inside huge databases of the healthcare industry. According to the table calculation, the system's maximum efficiency can offer up to a maximum efficiency that is more than the previous one of the current system. as displayed in Table 1.

Table 1- Comparison of Results

S.No	Method	Accuracy(%)	Time(S)
1	Sequential Minimal optimization	84.07	0.02
2	Bayes Net	81.11	0.02
3	Multilayer-Optimization	77.40	0.75
4	Navies Bayesian	89.77	0.01
5	ArtificialNeural Network	92.12	0.25

The graphical representation of the following data is shown in fig 4. As the graph increases the time decreases and it results with increase in the accuracy.

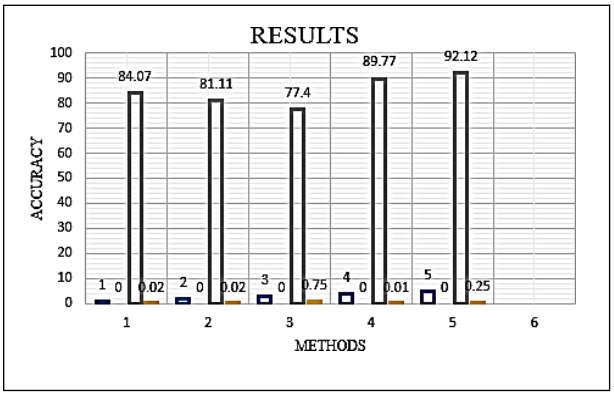

Fig.4 Comparison of Results with Proposed and Existing Model

This graph estimates the efficient accuracy for the new prediction method as the proposed method gives the accuracy of up to 92.12% the time may differ but this part gives the accurate and efficient output.

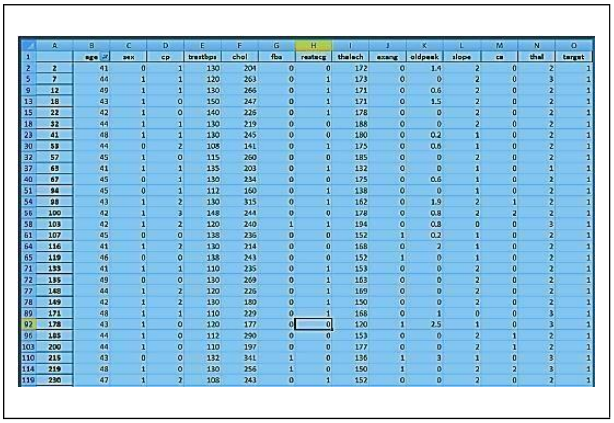

Fig 5 Data Sets

The Fig 5 represents the data that is processed in the system for predication and identification of disease which consist of various data like age, blood group, height, weight, oxygen level, respiration time, sugar level, thyroid level, and the haemoglobin pigment these are used for this algorithm to predict the disease accurately.

VIII Conclusion

Data is gathered from a variety of sources, including the fundamental and secondary causes of any cardiac illness that has happened, and then utilising image processing, a specific algorithm is created and flawlessly executed. The project focuses on developing HDP (Heart Disease Prediction), which implements the AES (Advanced Encryption Standard) algorithm and ANN (Artificial Neural Network) classification technique to address the problem of heart disease prediction. It turns out that despite decreasing the qualities, the dominant approach outperforms the ANN Algorithm in terms of accuracy, producing a precision of 92.12%. AES performs well in terms of security when compared to Navies Bayesian.

IX Future Scope

To create illness applications that enhance healthcare outcomes, application developers should collaborate with researchers and healthcare practitioners. Application- based heart disease prevention research would not be completely left behind by technological advancements if the research process was improved overall to cut down on delays.

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